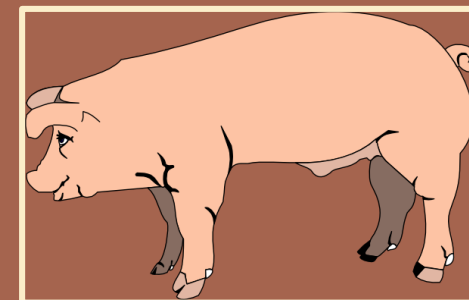
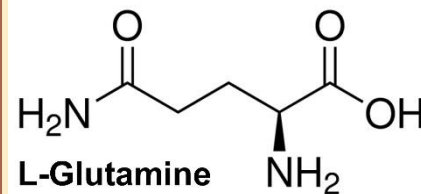


# L-glutamine as an Alternative to Growth Promoting Antibiotics for Swine

Supplementing swine diets with L-glutamine provides similar animal performance and health benefits as growth promoting dietary antibiotics. Results suggest that optimum supplementation level is at or around 0.4% of the diet to achieve maximum benefits. L-glutamine supplementation can enhance recovery from stressful events such as weaning and transport by reducing inflammation and improving intestinal health. Specific data regarding growth promotion and pig health are included in the patent application.

Docket No: 88.16

Contact: [Renee.wagner@ars.usda.gov](mailto:Renee.wagner@ars.usda.gov)



## Benefits

- Serves as a cost-effective replacement for growth promoting dietary antibiotics
- Improves growth rate and welfare of pigs in commercial production systems
- Enhances immune function and intestinal health of pigs

## Applications

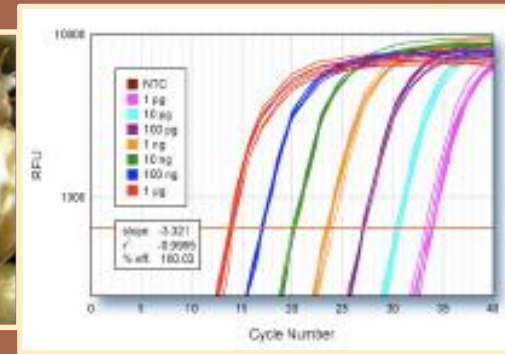
- Safe and efficacious dietary additive to promote growth, reduce inflammation and enhance intestinal health in swine reared in commercial swine production systems.

# Advancing Tick-Borne Disease Diagnostics

Ticks and tick-borne diseases kill humans and animals. Enhanced pathogen detection is needed to improve the diagnosis of these diseases. The TickPath Layerplex is an innovative quantitative PCR (qPCR) assay to detect several tick-borne pathogens simultaneously. This assay aids in the diagnosis and treatment of human and animal tick-borne diseases.

Docket No: 68.16

Contact: [Jeffrey.Walenta@ars.usda.gov](mailto:Jeffrey.Walenta@ars.usda.gov)



## Benefits

- Detects several groups of tick-borne pathogens in a sample simultaneously
- Distinguishes type of tick-borne pathogen in the sample simultaneously
- Guides decision for rapid and appropriate treatment
- Results obtained faster than with other types of assays

## Applications

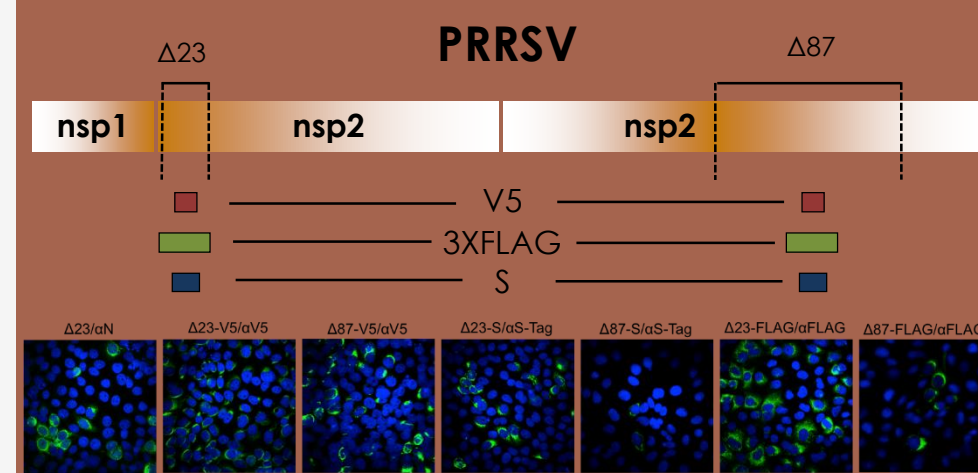
- Use during or after treatment of some tick-borne diseases as serologic titers can be persistent despite proper treatment of infection
- Replaces serologic titer assays which are unable to determine if an active infection is occurring
- Can assay whole tick, tick fluid and serum from dogs, cats cattle, etc.

# Viable Viruses with Foreign Tags

An attenuated porcine respiratory and reproductive syndrome virus vaccine has been engineered to harbor either one of two deletions and/or one of three small immunogenic tags at the two deletion sites. The eight viruses efficiently replicate, maintain the parental virus phenotype, and are stable in cell cultures.

Docket No: 133.16

Contact: [Renee.Wagner@ars.usda.gov](mailto:Renee.Wagner@ars.usda.gov)



## Benefits

- The viruses are stable in cultured cells
- Allow efficient localization of nonstructural protein 2 (nsp2)
- Can be used to locate differently tagged nsp2 in co-infection studies

## Applications

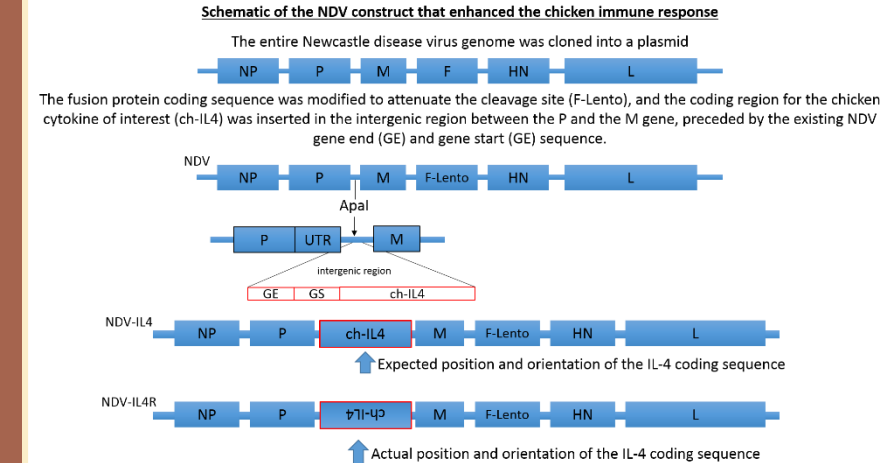
- Serves as a platform in developing new DIVA vaccines
- Molecular tool to study the role of nonstructural protein 2 in pathogenesis

# Altered Avian Virus for *In-Ovo* Inoculation

Attenuated recombinant Newcastle disease virus (NDV) vaccines, containing an antisense coding region of the chicken interleukin 4 (IL4R) inserted into the NDV viral genome, were evaluated as candidates for *in-ovo* vaccination. ARS results indicate that these altered NDV-IL4R vaccines are a reliable *in-ovo* immunogenic composition that modulates the host animal's immune response and induces good protection in the host upon challenge.

Docket No: 46.16

Contact: [Joe.Lipovsky@ars.usda.gov](mailto:Joe.Lipovsky@ars.usda.gov)



## Benefits

- The vaccine can be administered safely *in-ovo* so that animals are protected at an early stage of life
- Antisense IL4 was used as an adjuvant to enhance the safety and protection induced by the vaccines and to create stronger immune responses

## Applications

- Since Newcastle disease (ND) continues to be a threat to the poultry industry world-wide, this vaccine has the potential to be used as a novel, more effective *in-ovo* vaccine that elicits a strong immune response in hatchling chicks in order to decrease virulent virus replication and horizontal transmission

# Animal Behavior Monitor

A system for monitoring ruminant animal foraging that utilizes a piezoelectric film sensor in communication with a computer processor to record and characterize jaw movement data for the foraging ruminant animal. The processor applies pattern algorithms to categorize the jaw movement data so that the jaw movements are categorized as at least chewing, biting, ruminating, and/or idling. Knowledge about livestock behavior and resource use can inform management decisions that influence outcomes in agricultural production, the environment, and rural prosperity.

Docket No: 125.17

Contact: [Jim.Poulos@ars.usda.gov](mailto:Jim.Poulos@ars.usda.gov)



## Benefits

- The system quantifies grazing behavior, including grazing time, ruminating time, resting time, bites/min and bites/day
- It has GPS tracking at a fix frequency of 5 minutes. It can track time spent in sensitive areas (e.g. riparian) and time spent in forage patches (diet selection)
- Other metrics can be added, including tail switch to track nutrient deposition, activity monitor for # of steps, and bites/feeding station
- Remote data access and troubleshooting

## Applications

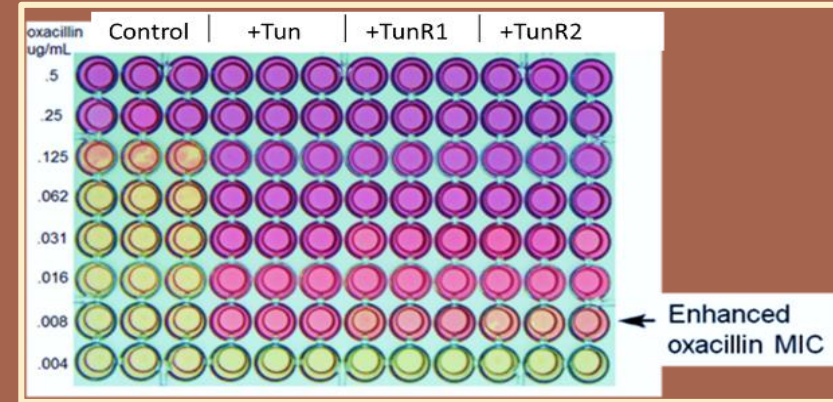
- This product would be of interest to grazing-based animal researchers
- It could be adapted for use for rangeland livestock, confinement livestock and for wildlife to monitor movement and grazing behavior

# Penicillin Enhancement by Modified Tunicamycins

The penicillins are the most commonly used antibiotics, with >60% utilized in agriculture, but resistance to penicillin is now widespread. The efficacy of penicillins are significantly improved by combining with modified tunicamycins, which are not toxic to eukaryotes. Modified tunicamycins (TunR1 and TunR2) enhance the penicillins efficacy by 32-64 fold, revitalizing penicillin's usage against resistant Gram-positive bacteria.

Docket No: 120.16

Contact: [Renee.Wagner@ars.usda.gov](mailto:Renee.Wagner@ars.usda.gov)



## Benefits

- Potent enhancement of medically-important penicillins
- Modifications drastically reduce the toxicity
- The combination of penicillin and modified tunicamycin are more efficacious than either penicillin or modified tunicamycin alone

## Applications

- TunR1 and TunR2 are potent penicillin enhancers with new uses in antibiotic formulations for medicine and agriculture

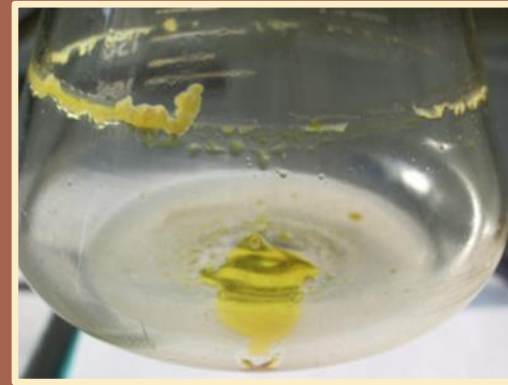
# Novel Oil Having Antibacterial Activity

Liamocins produced by certain strains of the fungus *Aureobasidium pullulan* have anti-bacterial activity with specificity for *Streptococcus spp.*, *Enterococcus spp.*, and *Bacillus spp.* The invention includes methods of using the liamocins and compositions containing modified liamocins to kill bacteria. This invention also relates to methods to produce modified liamocins with specific head groups.

(Life Sciences)

Docket No: 107.13 + 51.18

Contact: [Renee.Wagner@ars.usda.gov](mailto:Renee.Wagner@ars.usda.gov)



## Benefits

- Liamocins are chemically different than conventional antibiotics, and cross-resistance should be minimal
- May be effective for Streptococcus infections that do not respond to conventional antibiotic therapy
- The liamocins are produced from low-cost agricultural biomass substrates, particularly pretreated wheat straw

## Applications

- Dairy cattle dips for prevention of mastitis caused by Streptococcus sp.
- Topical antibacterial treatments
- In more refined forms, the pharmacologically active component(s) of the liamocins have potential to be incorporated into injectable or oral medicines

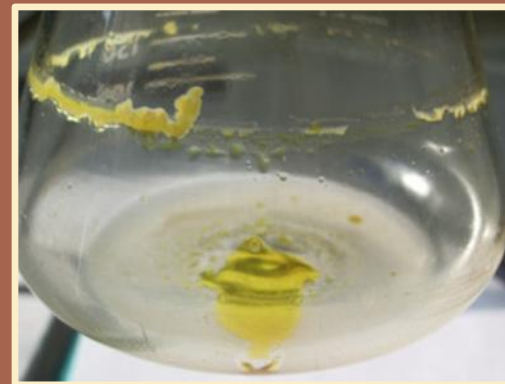
# Methods and Strains for Producing Bioproducts in *Aureobasidium Pullulans*

Methods for producing arabitol-containing liamocin and other bioproducts from novel genetically altered strains of *Aureobasidium pullulans*. The *A. pullulans* strains contain genetic alterations to control the type of liamocin produced and decrease unwanted bio-products and bio-contaminants. Other useful bio-products produced include exophilins, massoia lactone, pullulan and liamocins with other head groups. The bioproducts can be produced melanin-free.

(Life Sciences, Medical-Health)

Docket No: 69.15

Contact: [Renee.Wagner@ars.usda.gov](mailto:Renee.Wagner@ars.usda.gov)



## Benefits

- The modified *A. pullulans* produce near 100% arabitol-containing liamocins on an inexpensive carbon sources such as glucose
- The liamocins and other bio-products produced are melanin-free

## Applications

- Antibacterial activities of liamocins against certain Gram positive organisms may have potential applications as a veterinary treatment
- Potential chemical feedstock for the synthesis of a variety of products such as biosurfactants and polymers
- Antifouling agent, phytopathogen control agent

# Compositions and Methods for Repelling Bloodsucking and Biting Insects, Ticks and Mites

Structures, activities and synthetic methods of chromenes and their analogs as repellents that can be used as personal protection against blood sucking and biting insects and arthropods such as mosquitoes, ticks, and fleas.

*(Medical-Health)*

Docket No: 73.16

Contact: [Joe.Lipovsky@ars.usda.gov](mailto:Joe.Lipovsky@ars.usda.gov)



## Benefits

- Long lasting natural products
- Biodegradable

## Applications

- Plant derived Insect repellent that could potentially be applied to skin, hair and clothing. It could be applied as a spray, cream, ointment, paste or powder with a suitable medium or carrier

# In Vitro Parasite Feeding System

The system includes a feeding vessel having an inlet, an outlet, and a membrane positioned across an opening in the vessel. Parasites (preferably ticks) are allowed to attach themselves to the membrane so that as a feeding fluid (preferably blood) is circulated through the vessel, the parasites feed on the feeding fluid through the membrane.

*(Medical-Health)*

Docket No: 116.15

Contact: [David.Nicholson@ars.usda.gov](mailto:David.Nicholson@ars.usda.gov)



## Benefits

- A simple, flexible, and economical tick feeding system that closely simulates a tick's preferred host throughout the entire tick life cycle
- Standardized, quality controlled vaccine production

## Applications

- Full tick life cycle system for production of live pathogen stage specific vaccines or testing of anti-tick compounds

# Genetically Modified *Babesia* Parasites Expressing Protective Tick Antigens

Methods for stable transfection of *Babesia* parasites with any heterologous DNA and genetically altered *Babesia* expressing heterologous DNA. One application can be for vaccines conferring immunity against parasitic arthropods. The method involves transfecting foreign DNA into *Babesia* resulting in genetically modified parasites that will be able to express foreign genes in animal hosts. Divisional patent application. Parent U.S. patent No. is 9,265,818.

(Medical-Health)

Docket No: 35.16

Contact: [David.Nicholson@ars.usda.gov](mailto:David.Nicholson@ars.usda.gov)



## Benefits

- Application would be a single dose of a bivalent vaccine
- Eliminates the need for recombinant protein production used in vaccines

## Applications

- Facilitate control of both, ticks and tick-borne diseases in animals
- For expressing any desired antigen or other protein in animals that are infected with the genetically altered *Babesia*
- For vaccinating cattle in tropical areas of the world where gathering cattle could be a cumbersome procedure

# Dart Delivery System

A remote dart delivery system for accurately delivering a powdered medication and/or vaccine to animals at an extended range of up to 100 yards. The dart delivery system is designed to be fired from a conventional shotgun.

*(Life Sciences)*

Docket No: 127.14

Contact: [Jeffrey.Walenta@ars.usda.gov](mailto:Jeffrey.Walenta@ars.usda.gov)



## Benefits

- Darts are fired from a conventional shot gun so there is no need to purchase a specifically designed gun
- The darts contain a drug or vaccine, in a powdered, pelleted, or lyophilized state which have a longer shelf-life than a conventional dart delivery system
- The system has a unique animal marking system which is incorporated into the design of the dart

## • Applications

- Veterinarians and livestock producers to remotely deliver vaccines and powdered medications to livestock without having to purchase a gun designed specifically for the delivery of darts

# Spontaneously Immortalized Avian Cell Line

A spontaneously immortalized avian cell line, designated ZS-1, derived from the primary chicken embryonic fibroblasts.

*(Life Sciences)*

Docket No: 87.13

Contact: [Renee.Wagner@ars.usda.gov](mailto:Renee.Wagner@ars.usda.gov)

## Benefits

- The immortal cell line is free of avian leukosis virus (ALV) and yet susceptible to all subgroups of ALV, including subgroup E
- Supports virus replication

## Applications

- Production of viral agents, e.g., recombinant viral agents, expression of recombinant proteins, diagnostic assays of pathological specimens, etc.

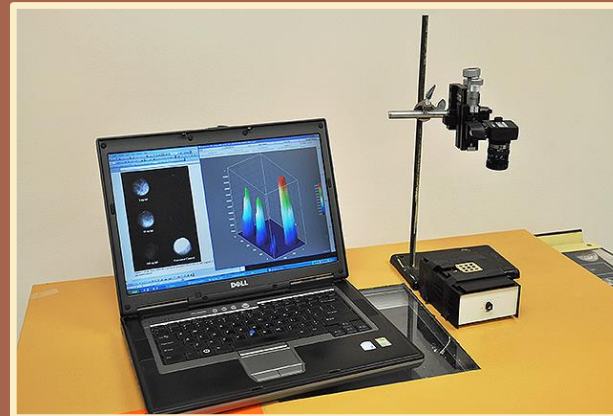
# High Affinity Monoclonal Antibodies for Detection of Shiga Toxin 2 (STX2)

High affinity monoclonal antibodies against Shiga toxin strain Stx2 and hybridomas that produce such antibodies are described. The antibodies may be used in a kit for detecting Stx2 and variants thereof in a sample.

*(Life Sciences, Medical-Health)*

Docket No: 186.11 & 79.14

Contact: [David.Nicholson@ars.usda.gov](mailto:David.Nicholson@ars.usda.gov)



## Benefits

- The hybridoma cell lines produce monoclonal antibodies that detect all four variants of Stx2
- Immunoassays are rapid, highly specific and sensitive

## Applications

- Basis for developing a sensitive immunoassays for detecting variants for Shiga toxin 2
- Immunoassays could be used for monitoring and source-tracking food supplies as well as monitoring contamination of clinical and environmental samples such as feces, soil, air, and water.